
3.0 Chapter 3 – Data Collection

Data collection for CORSIM freeway studies need to be conducted to match modeling requirements as defined in the project scoping process. The type of information that needs to be gathered includes information for model setup (traffic volumes, geometry, signal timings) and for model calibration (observed speeds, traffic queuing). This information should be completely gathered before the CORSIM model is created. The following chapter will describe the data requirements, provide some examples, and make reference to other manuals that describe data collection techniques in further detail.

3.1 Base Mapping

Good base mapping can make the difference between a successful start to a model or a disaster that you never recover from. Mn/DOT has very good base mapping available for the freeway system from which a model can be prepared. If the project is in the preliminary engineering phase, the base mapping will be assembled, and the proposed concepts will be drawn out in CAD.

3.2 Field Review

After a base map and modeling limits have been discussed, the modeler should drive through the project area during peak conditions. The purpose of this initial viewing of the project is to identify hot spot locations, apparent visual cues that affect operations. A set of notes should be assembled to document these observations. The field review will occur throughout the modeling process, especially during the calibration process. While trying to calibrate the model, it is possible that the real cause of congestion is not apparent; the animation output may cause you to question why congestion is occurring. Going out in the field to re-review conditions with more specific questions may be the only way to resolve the issue.

The Traffic Management Center (TMC) surveillance cameras are useful for making observations; the camera surveillance should be used to supplement the field review. One problem with relying solely on the cameras for field review is the limitations of the field of view of the cameras. The cameras are a 2-D image and may not capture what the cause of the congestion.

Depending on the location, it may be useful to get out of the car and stand on a bridge or overpass to observe operations. In particular, at ramp junctions to observe how drivers are responding to entering vehicles. Do drivers on the freeway move out of the way or yield to entering traffic? If so, where do they change lanes? Are vehicles using the shoulder? At on ramp locations with auxiliary lanes, are drivers using the full lane to accelerate or are they changing lanes at the first opportunity?

These questions and what the observations will direct the calibration process. The way drivers in the real world use the road system can be very different within the same model. The modeler must be aware of these potential differences and document them so they can be incorporated properly into the model.

3.3 Traffic Volumes

Traffic volumes are essential to traffic modeling. Without traffic volumes, there is no traffic model. Collecting traffic volume data for freeway studies in Minnesota can be

divided into two areas, traffic data from the instrumented system and traffic data from the un-instrumented system. Collecting data from the instrumented system is straightforward, accurate, and efficient. Gathering freeway data on the un-instrumented system is a manual process that requires more effort and is more costly. In both cases, great attention needs to be given to balancing traffic counts. Traffic must balance in order for the CORSIM model to run as expected and to be calibrated.

The requirements for traffic count information to be collected are:

- Traffic volumes on the freeway for morning and evening peak 3-hour period as identified in the scoping process.
- Turning movement counts at ramp terminal intersections should not be older than 2 years, and must include the 3-hour peak periods.
- All counts should be summarized by 15-minute intervals.

For the metro area, the month of October has been selected as the month that is the most representative of the conditions for which design should occur. Data pulls for CORSIM modeling projects on the instrumented system should be done for the month of October.

3.3.1 Instrumented System

Gathering count information from the instrumented system is done by identifying all the count stations and detectors within the model limits and providing a list of the stations/detectors to Mn/DOT's TMC representative responsible for data requests. These counts should be requested with mainline detectors and on and off ramps in sequence. For instance, the first station would be the beginning of the mainline freeway, followed by the next ramp, followed by the next mainline station, followed by the next mainline station, etc. The information pertaining to detectors is contained in the All Detector Report (ADR). Figure 6 below is the detector legend from the ADR; the rest of the ADR is divided by facility.

Data from the instrumented system needs to be cross-referenced against incident reports and weather conditions. Traffic data used for the model should reflect the highest amount of traffic that can get through the system on a normal day. In some areas of the metro, it will be very difficult to find a normal day free of incidents and inclement weather. If such data cannot be found in the initial data request, request data for different days.

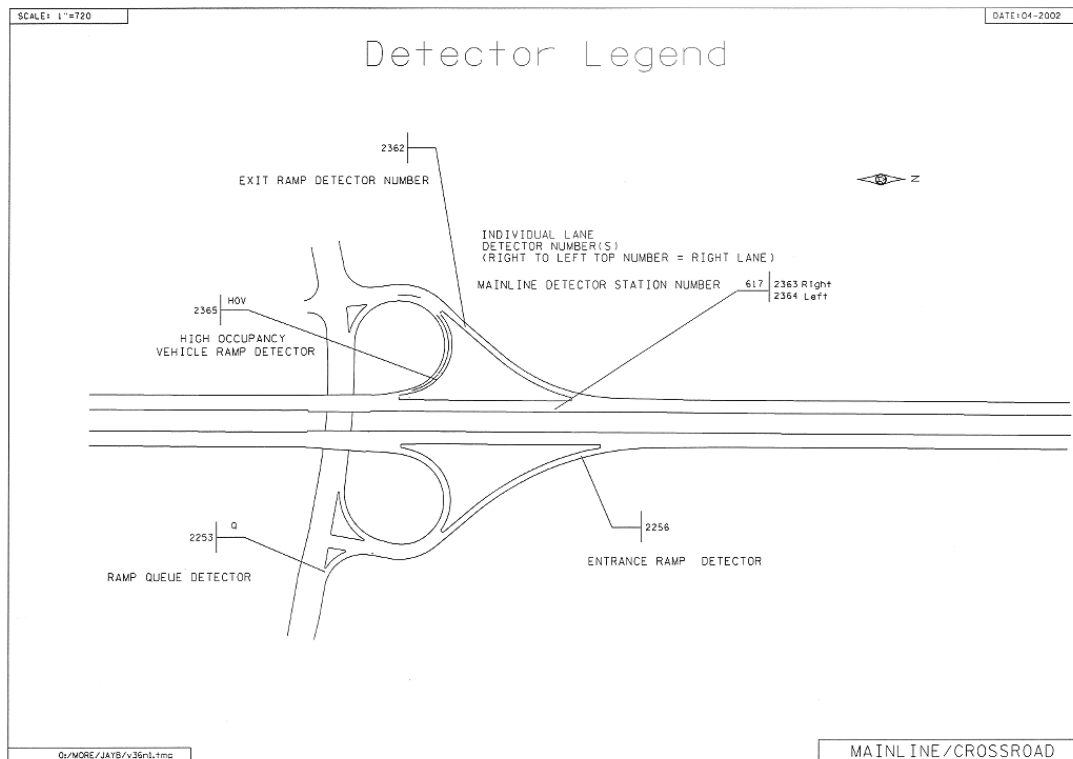


Figure 6 – ADR Detector Legend

3.3.2 Un-instrumented System

Collecting traffic counts on the freeway system where there is no instrumentation can be very costly. It is important that the modeling limits are thought through very carefully, because going back to collect more information later creates other discrepancies. The goal of collecting data on the un-instrumented system is to collect as much data as possible at the same time. Tube counts on the mainline should be done in at least two places in the event that the tubes are ripped. All ramps within the study should be counted simultaneous with the mainline counts, either with tubes or with manual turning movement counts at the ramp terminal intersections. Balancing counts that were taken at the same time is much easier balancing than counts that were collected at different times.

3.3.3 Intersection Turning Movement Counts

Off the freeway system at ramp terminal intersections and other adjacent intersections traffic information is gathered by manual turning movement counts. Mn/DOT collects these counts on a periodic basis. However, if the data is more than two years old, the intersections should be recounted. If the study is being conducted on the un-instrumented system, the ramp terminal intersection counts can provide the on and off ramp count information.

3.3.4 Balancing Counts

Balancing traffic counts is an important traffic engineering skill that is essential in a micro-simulation process. Micro-simulation programs including CORSIM operate from

the outside to the inside. What happens is the total numbers of vehicles are entered from the entry nodes at the perimeter of the model. As vehicles travel to the interior of the model, each individual vehicle is assigned a direction to take based on the turning percentages calculated at each junction. So even though the turning volumes in vph are entered at each junction, the values are converted into percentages. The model will not know whether or not the counts are balanced and will assign traffic according to the percentage.

The process for balancing counts is to review the data as a whole and identify traffic counts by direction that is not consistent with the surrounding data. For the freeway loop detector volumes on the instrumented system, identifying inconsistent data can be done by reviewing the detector summary graphs. These graphs will indicate from the system volume trends for all of the detectors and will provide an indication of the ones that are not working properly. Figure 7 below is a sample of speed flow information that can be used to review detector data.

In all cases, the traffic counts will have to be checked by starting at the beginning or perimeter of the system and add and subtract entering and exiting traffic. Along the way, the count information should match the counts from one station to the next. If it does not balance, a decision needs to be made on how to best reconcile the counts.

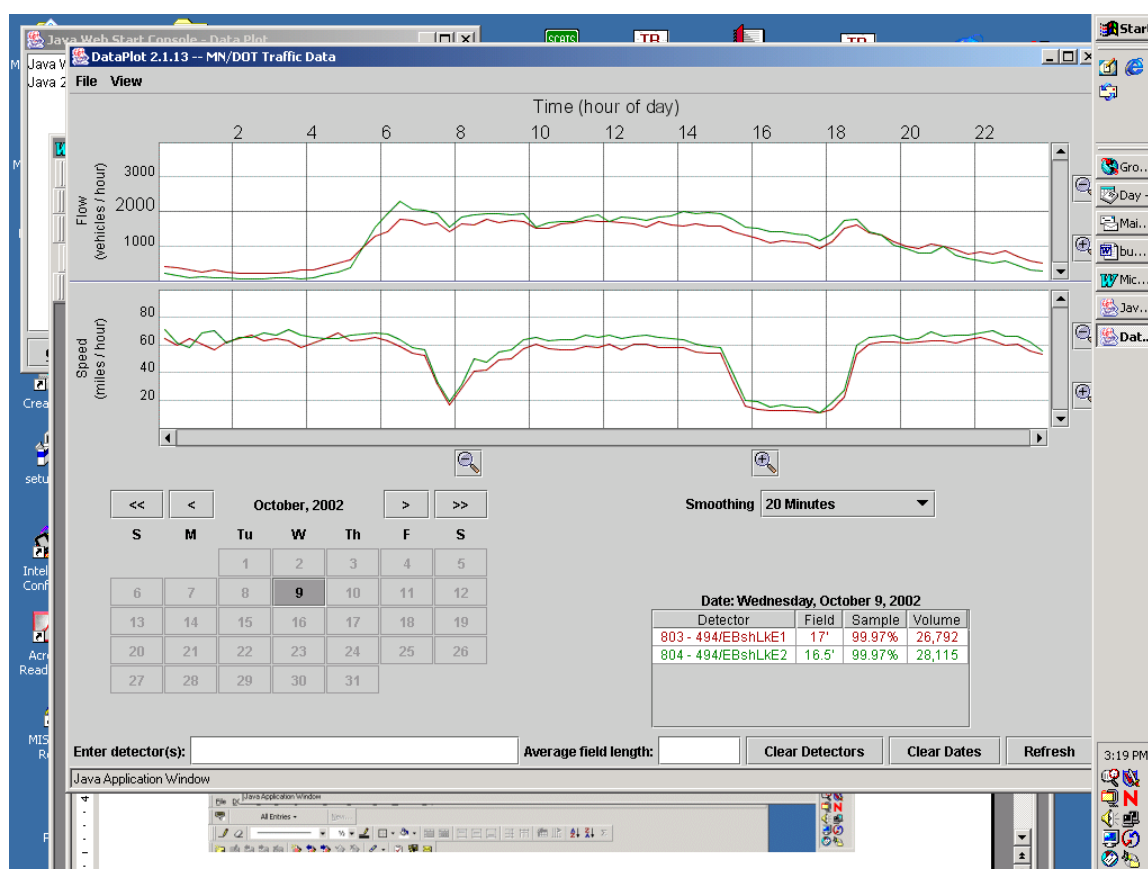


Figure 7 – Data Plot sample-Evaluating Detector Data

3.4 Speed Studies

Speed information is collected from the system in two ways. For the instrumented system, spot speeds at detectors can be gathered. The speed information taken from these detectors is derived and can be subject to error. To ensure that operations are clearly understood for both instrumented and un-instrumented systems, a speed study using the floating car method is required. The data collection requirements include at least 10 runs per freeway direction within the 3-hour peak period with 3 of these runs occurring within the peak hour.

Collecting speed study information using the floating car method can be done two ways. The first way, and preferred method, is to use an in vehicle recording device. PC Travel is a widely used product that does speed studies by recording the speed trajectory of the trip. The user will hit a button at select locations to identify benchmarks. Figure 8 is sample speed flow chart from PC Travel. The second method is a manual method in which a tester drives the freeway and documents the speed as key points are passed. Figure 9 is a sample data set summarized using this method.

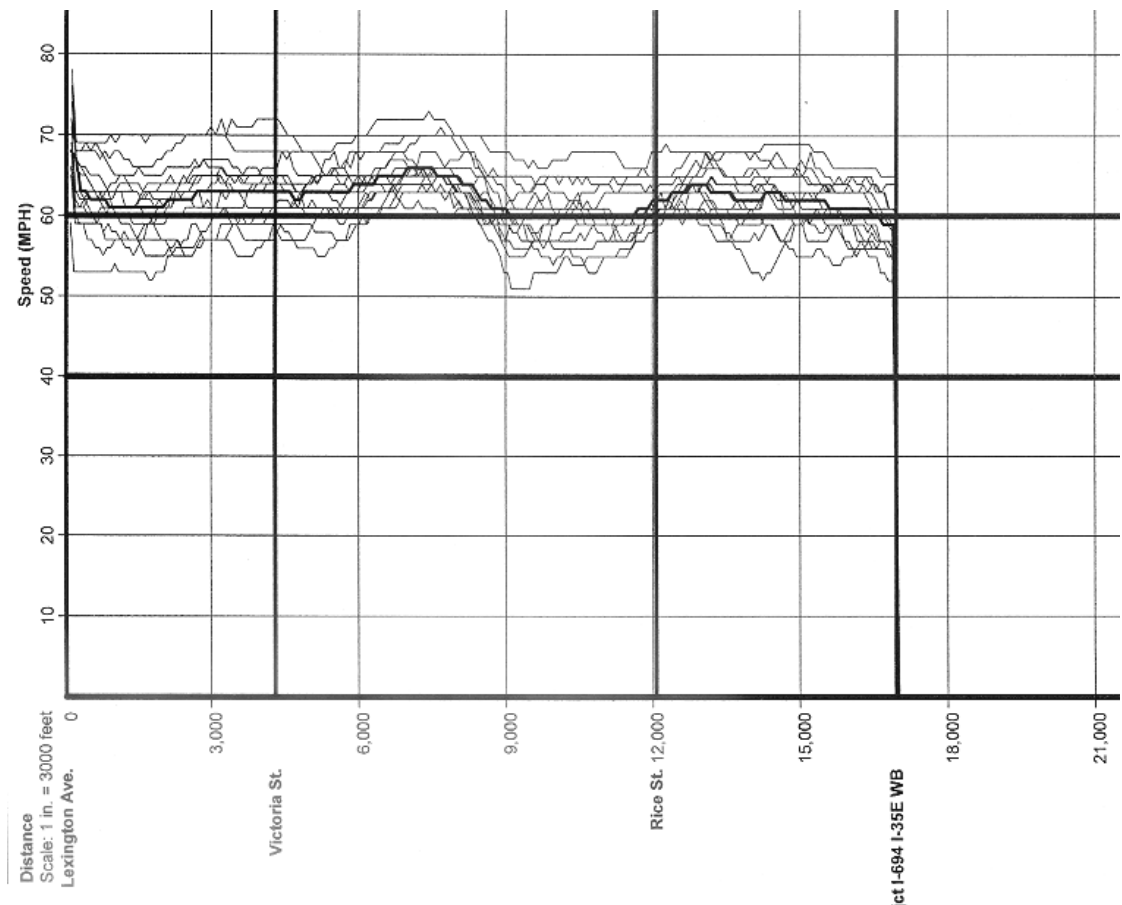


Figure 8 – Speed Study Graphic-PC Travel

description	distance between	cumulative length	Spot Speeds Start Time and Run Number				
			7:10 AM	7:22 AM	7:35 AM	7:40 AM	7:50 AM
			Run #1	Run #2	Run #3	Run #4	Run #5
Lexington Ave exit-ramp	0	0	15	25	22	25	30
Lexington Ave on-ramp	1880	1880	42	40	45	38	23
Victoria St Exit	3900	5780	50	52	48	46	51
Victoria St on-ramp	1500	7280	41	37	36	40	39
north rail bridge	4100	11380	55	58	53	51	58
Rice St exit	2200	13580	32	28	35	33	31
Rice St entrance	1950	15530	20	19	15	18	22
West Junction I-694	4200	19730	15	10	12	14	18

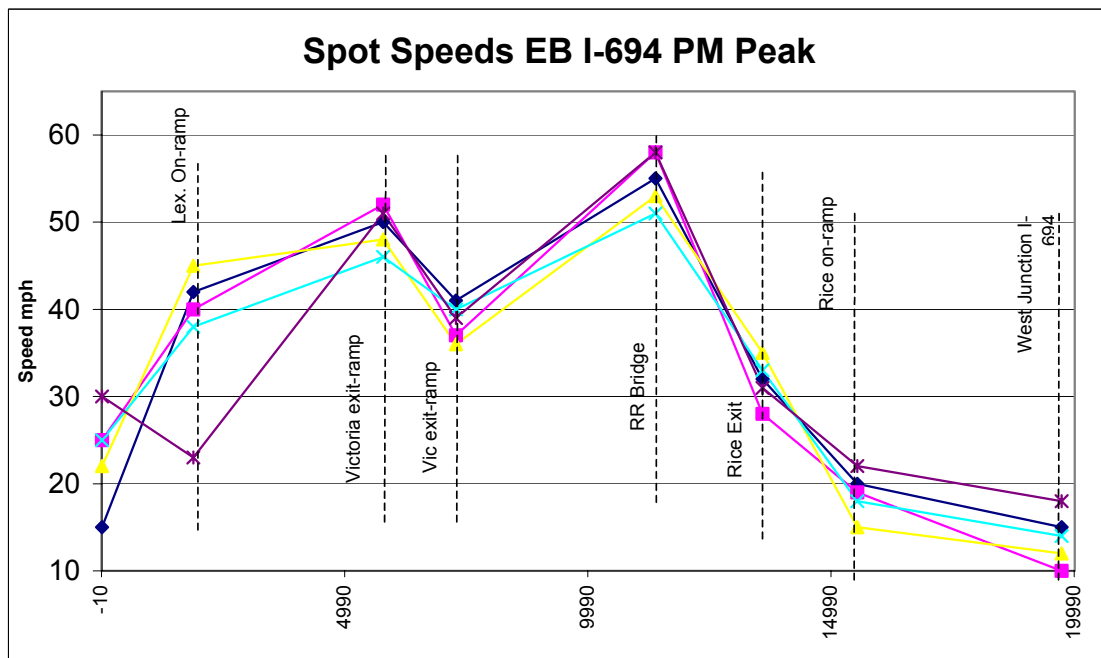


Figure 9 – Speed Study Sample-Manual Technique

3.5 Queue Observations

Queue observations are conducted at the ramp terminal intersections during the peak periods. The observations should be done to observe the maximum queues.

3.6 License Plate Origin-Destination Studies

License plate origin-destination (O-D) studies conducted on high-speed facilities are very difficult and expensive to do. This is not required for most projects because of the costs. However, if the study has contentious issues regarding weaving percentages and it is deemed necessary, then an O-D study should be conducted. The number of firms with the capability and technology to do this type of study is limited to one or two in the entire country. The equipment required to do the studies includes a number of high-speed video cameras (typical video recorders for home use will not work!) and data recognition

software that will read the license plates automatically. Manually reading every license plate is not cost effective; also the software for reading the license plate can easily add a time stamp that is essential for calculating O-Ds.